JEE MAIN 2026 – Memory-Based Questions and Answers

Session 1 | Date: 22 January 2026 **Shift:** 2

Duration: 3 Hours

Maximum Marks: 300

Note: This paper is prepared based on students' memory and post-exam discussions. Questions may not be exact replicas of the actual exam and are meant only for practice and analysis.

PHYSICS

Section A – MCQs

1. In an open organ pipe, the difference between the frequencies of the 3rd and 6th harmonics is 3200 Hz. If the velocity of sound is 320 m/s, find the length of the pipe.

2. Three identical air bubbles, each having the same charge, combine to form a single bubble. What is the ratio of the electric potential of the initial bubble to that of the final bubble?

3. A gas initially at 1 atm, 60 mL, and 27°C is compressed to 30 mL and heated to 77°C. Find the final pressure of the gas.

4. Two blocks of masses mmm and 2m2m2m are connected by a string over a pulley of mass 3 kg. If the heavier block descends through a height of 3.6 m, find its speed.

5. In a capillary tube, if both the radius and density of the liquid decrease by 1%, what will be the percentage change in the height of capillary rise?

6. A charged particle enters a uniform magnetic field perpendicular to the field direction. Which of the following quantities remains unchanged?

7. The work function of a metal is 4 eV. Find the stopping potential when light of frequency 2×10152 × 10^{15}2×1015 Hz is incident on it.

8. A capacitor is connected to a battery and then disconnected. It is then connected to an inductor. Find the time at which 25% of the energy is transferred to the inductor.

9. A ray of light is incident parallel to the base of a prism. The emergent ray just grazes the second face. If the refractive index is 2\sqrt{2}2, find the angle of the prism.

10. A diatomic gas performs 100 J of work during an isobaric process. Find the heat supplied to the gas.

Section B – Numerical Value Questions

11. Find the de Broglie wavelength of a proton accelerated through a potential difference of 100 V.

12. The rms speed of oxygen molecules at 47°C is equal to the rms speed of hydrogen molecules at what temperature?

13. Find the charge stored on a capacitor in steady state if the given circuit parameters are known.

14. The equation of motion of a particle is x=at3+bt2+ctx = at^3 + bt^2 + ctx=at3+bt2+ct. Find the work done from t=2t = 2t=2 s to t=3t = 3t=3 s.

15. Find the equivalent resistance of the given circuit arrangement.

CHEMISTRY

Section A – MCQs

1. Arrange the elements of Group 16 in decreasing order of electron gain enthalpy (magnitude).

2. Arrange the following species in decreasing order of ionization enthalpy:
   F, Cl, F^-, Cl^-

3. Which of the following combinations represents a basic buffer solution?

4. Identify the mixed oxide among the following.

5. One gram of an organic compound gives 1.49 g of $Mg_2P_2O_7$ on analysis. Find the percentage of phosphorus in the compound.

6. Which of the following molecules is optically active?

7. When 8.74 g of MnO_2 reacts with excess concentrated HCl, calculate the mass of chlorine gas evolved.

8. Identify the oxidation state of the central atom in the product formed when potassium dichromate reacts in acidic medium.

9. Arrange the following species in decreasing order of nucleophilicity.

10. Match List-I with List-II based on structural isomerism.

Section B – Numerical Value Questions

11. Calculate the mole fraction of H_2SO_4 when 100 g of 98% H_2SO_4 is mixed with 100 g of 49% H_2SO_4.

12. Find the number of bromine atoms present in the final product of the given reaction sequence.

13. Calculate the percentage of carbon in the given optically active compound.

14. Determine the pH of the given buffer solution.

15. Calculate the equilibrium constant for the reaction at a given temperature.

MATHEMATICS

Section A – MCQs

1. A projectile is thrown with an initial velocity at an angle of 60°. When its direction of motion becomes 45°, its speed is 20 m/s. Find the initial speed.

2. If the sum of the first 4 terms of an AP is 6 and the sum of the first 6 terms is 4, find the sum of the first 12 terms.

3. Let α\alphaα and β\betaβ be the roots of the equation x2−5x+6=0x^2 - 5x + 6 = 0x2−5x+6=0. Find α2+β2\alpha^2 + \beta^2α2+β2.

4. Find the domain of the function f(x)=2x−1f(x) = \sqrt{2x - 1}f(x)=2x−1.

5. Find the equation of the circle with center (2, −1) and radius 3.

6. Evaluate the given definite integral involving exponential functions.

7. If the determinant of a 3 × 3 matrix is zero, what can be concluded about the system of linear equations?

8. Find the maximum value of
   (cos5x)2+(sin5x)2(\cos^5 x)^2 + (\sin^5 x)^2(cos5x)2+(sin5x)2
9. If a line touches an ellipse, find the condition satisfied by its coefficients.

10. Find the locus of the centroid of a triangle formed under given conditions.

Section B – Numerical Value Questions

11. Evaluate the integral and find the value of 2a+b2a + b2a+b.

12. Find the minimum value of α+β\alpha + \betaα+β for a point dividing a focal chord of a parabola.

13. Find the largest power of 7 dividing 101!.

14. Solve the given differential equation and find the required constant.

15. Find the area of the region bounded by the given curves.